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Hiromu Ohara

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EXAMINER

AZARIAN, SEYED H

ART UNIT

PAPER NUMBER

2625

DATE MAILED: 08/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/843,079

Applicant(s)

OHARA, HIROMU

Examiner

Seyed Azarian

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 27 April 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-28 and 30-44 is/are rejected.
- 7) ☒ Claim(s) 9 and 29 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### **Claim Rejections - 35 USC § 102**

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 1-5, 11-13, 25, 26 and 31-44, are rejected under 35 U.S.C. 102(e) as being anticipated by Wilkins et al (U.S. patent 6,226,353).

Regarding claim 1, Wilkins discloses a phase contrast radiographic image processing apparatus, comprising (column 2, lines 12-20, provide a phase-contrast image);

a management information storing section to store management information regarding a radiography (column 4, lines 38-55, stored program of machine readable, defining an image of phase change introduced by radiation a phase-contrast image for object);

and an image processing section to apply an image processing onto a phase contrast radiographic image produced by the phase contrast radiography (see abstract, also column 2, lines 12-20);

wherein the image processing section determines an image processing condition based on the management information stored in the management information storing section and conducts

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the image processing based on the determined image processing condition (column 5, lines 3-14, stored program to utilize values and any predetermined uniform boundary condition to derive a grid of values defining an image of the phase change introduced by the object).

Regarding claim 2, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 1 wherein the management information indicates information regarding radiography for an object to be radiographed and an identification of the object (column 1, lines 5-12, the observation of structural features of objects by radiographic measurements).

Regarding claim 3, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 2, wherein the information regarding the radiography includes at least one of a section to be radiographed, a radiographing attitude, a radiographing method, a radiographing condition, a kind of a radiation image such as a phase contrast radiographic image or an ordinary radiographic image, a sampling pitch in a detector, and an object of a diagnosis (column 4, lines 4-23, receiving at least a portion of radiation at a detector, also Fig. 1, column 6, line 56 through column 7, line 5).

Regarding claim 4, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 3, wherein the radiographing condition includes at least one of a tube current, a positional relationship among a radiation date, a X-ray tube and an object to be radiographed, an enlargement ratio, and information whether or not a grid to eliminate scattered X-rays is used (column 6, lines 56 through column 7, line 4, Fig. 1, spherical wave front W1 emanating from the point source S (tube) becomes distorted to W2 on passing through the object O, also column 5, lines 3-14, derive a grid of values defining an image of the phase change introduced by the object in the "penetrating radiation" or (eliminate scattered X-ray)).

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Regarding claim 5, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 1, further comprising: a interest region setting section to set a desired interest region by analyzing the phase contrast radiographic image; wherein the image processing section determines the image processing condition based on image signals in the interest region set by the interest region setting section (column 7, lines 11-29, desirable properties such as wide dynamic range).

Regarding claim 11, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 1, wherein the image processing section comprises a frequency enhancement processing section to determine a frequency enhancement processing condition based on the management information regarding the radiography and to conduct a frequency enhancement processing (column 3, lines 7-22, image intensity may be recorded for each pixel over enhanced resolution).

Regarding claim 12, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 1, wherein the image processing section comprises a dynamic range compression processing section to determines a dynamic range compression processing condition based on the management information regarding the radiography and to conduct a dynamic range compression processing (column 7, lines 20-29, desirable properties such as wide dynamic range).

Regarding claim 13, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 1, further comprising a radiation image detecting section to output image signals corresponding to a captured phase contrast radiographic image (column 3, lines 7-22).

Regarding claim 25, Wilkins discloses a phase contrast radiographic image processing

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apparatus, comprising: a first image processing section to apply an image processing onto a phase contrast radiographic image based on a first image processing condition, and a second image processing section to apply an image processing onto an ordinary radiographic image based on a second image processing condition different from the first image processing condition (Fig. 2, column 12, lines 17-34, two image intensity distributions).

Regarding claim 36, Wilkins discloses a phase contrast radiographic image processing apparatus, comprising: an addition and/or subtraction processing section to obtain an addition and/or subtraction image by conducting an addition and/or subtraction processing for plural radiation images obtained by radiographing the same object, wherein the plural radiation images comprises at least one sheet of a phase contrast radiographic image (column 17, line 65 through column 18, line 15).

Regarding claim 37, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 36, wherein the plural radiation images are radiographed with irradiation of X-ray by a single time (Fig. 4, column 17, lines 30-41).

Regarding claim 38, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 36, wherein a filter containing a material absorbing a low energy component of radiation is located at least at one place among detectors (column 15, lines 35-42, filter processing).

Regarding claim 39, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 36, wherein a weight adding section to add a predetermined weight to the plural radiation images (column 10, lines 18-32).

Regarding claim 40, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 36, further comprising: a size and position adjusting section to adjust sizes and positions of the plural radiation images (Fig. 3, column 15, lines 51-63).

Regarding claim 43, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 36, further comprising: an abnormal shadow candidate detecting section to detect an abnormal candidate by analyzing the subtraction image (column 17, lines 43-63).

Regarding claim 44, Wilkins discloses the phase contrast radiographic image processing apparatus of claim 36, further comprising: an abnormal shadow candidate detecting section to detect an abnormal candidate by analyzing the addition image (Fig. 2, column 12, lines 17-33).

Regarding claims 31-34, it recites similar limitation as claims 11 and 12 are similarly analyzed.

Regarding claim 35, it recites similar limitation as claim 13 is similarly analyzed.

Regarding claims 26, and 41-42, it recites similar limitation as claims 2, 3 and 5 are similarly analyzed.

### **Claim Rejections - 35 USC § 103**

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 6-8, 10, 27-28 and 30, are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilkins et al (U.S. patent 6,226,353) in view Sako (U.S. patent 6,671,394).

Regarding claim 6, Wilkins fails to disclose “gradation processing section to conduct a process to convert gradation”. On the other hand Sako teaches a showing of a general gradation processing function in a gradation conversion process employed as image processing (Fig. 12, 13A, column 3, lines 10-20).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Wilkins diagnostic system invention according to the teaching of Sako because it provides coordinate-converted imaging signals that are subject to correction of gradations (density correction) such as contrast levels and brightness degrees in normalization process, which can easily be implemented in an X-ray device such as radiographic image.

Regarding claim 7, Sako discloses the phase contrast radiographic image processing apparatus of claim 6, wherein the image processing means comprises a gradation conversion curve storing section to store plural gradation conversion curves and the gradation processing section selects one of the plural gradation conversion curves stored in the gradation conversion



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curve storing section and conducts the process to convert gradation based on the selected gradation curve (see claim 6, also Fig. 13, column 13, line 64 through column 14, line 16, gradation conversion processing is adjusted to obtain a desired or select gradation processing function).

Regarding claim 8, Sako the phase contrast radiographic image processing apparatus of claim 7, wherein the gradation processing section selects the one of the plural gradation conversion curves stored in the gradation conversion curve storing section based on the management information regarding the radiography (Fig. 13A and 13B, column 16, lines 36-52, (gradation curve), gradation degree are computed from image collection and “computation result” are stored in a memory or the like corresponding to the image “collection conditions”

Regarding claims 10, 27-28 and 30, it recites similar limitation as claims 6, 7 and 8 are similarly analyzed.

4. Claims 14-24, are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilkins et al (U.S. patent 6,226,353) in view Yamada (U.S. patent 6,510,253).

Regarding claim 14, Wilkins fails to disclose “radiographic image with a reduction ratio ”. On the other hand Yamada teaches reduction processing, which response characteristic can be changed continuously, regardless of the enlargement or reduction ratio (column 5, lines 43-52).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Wilkins’s invention according to the teaching of Yamada because it provides processing information which converts the image information to an image having an arbitrary enlargement or reduction ratio which, enabling an operator to input a desired reduction ratio that implements in an diagnostic device.

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Regarding claims 20 and 21, Wilkins fails to disclose “the interpolation process and spline interpolation and cubic convolution interpolation”. On the other hand Yamada teaches interpolation operation from comparatively high sharpness operation such as cubic spline interpolation to comparatively low sharpness operation such as B spline (column 5, lines 42-52).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Wilkins diagnostic system invention according to the teaching of Yamada because it provides interpolation processing wherein interpolation operations change sharpness continuously, ranging from high to low (the cubic spline interpolation operation and the like), that can easily implemented in an imaging device such as X-ray system.

Regarding claims 16 and 22, it recites similar limitation as claims 14 and 20, are similarly analyzed.

Regarding claims 15, 17-19 and 23-24, it recites similar limitation as claims 3 and 5, are similarly analyzed.

### Allowable Subject Matter

5. Claims 9 and 29, are objected as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitation of the base claim and any intervening claims.

### Other prior art cited

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. patent (4,096,391) to Barnes is cited for method and apparatus for reduction of scatter in diagnostic radiology.

U.S. patent (5,982,953) to Yanagita et al is cited for image displaying apparatus of a processed image from temporally sequential images.

U.S. patent (6,594,335) to Davidson is cited for X-ray phase-contrast medical micro-imaging method.

U.S. patent (6,001,334) to Hirai is cited for extremely high density barium suspension as a medium for upper gastrointestinal examination.

U.S. patent (6,071,491) to Epstein et al is cited for detection of necrotic malignant tissue and associated therapy.

### **Contact Information**

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed Azarian whose telephone number is (703) 306-5907. The examiner can normally be reached on Monday through Thursday from 6:00 a.m. to 7:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta, can be reached at (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR.

Status information about the PAIR system, see [http:// pair-direct.uspto.gov](http://pair-direct.uspto.gov). Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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August 3, 2004